

What is claimed is:

1. A magneto-resistance effect element comprising:
  - a first ferromagnetic layer serving as a magnetization fixed layer;
  - a magnetization free layer comprising a second ferromagnetic layer provided on one side of the first ferromagnetic layer, a third ferromagnetic layer which is formed on an opposite side of the second ferromagnetic layer from the first ferromagnetic layer and has a film face having an area larger than that of the second ferromagnetic layer and whose magnetization direction is changeable by an external magnetic field, and an intermediate layer which is provided between the second ferromagnetic layer and the third ferromagnetic layer and which transmits a change of magnetization direction of the third ferromagnetic layer to the second ferromagnetic layer; and
  - a tunnel barrier layer provided between the first ferromagnetic layer and the second ferromagnetic layer.
2. The magneto-resistance effect element according to claim 1, wherein the second ferromagnetic layer and the third ferromagnetic layer are magnetically coupled via the intermediate layer.
3. The magneto-resistance effect element according to claim 1, wherein an aspect ratio of a plane shape of the third ferromagnetic layer is within a range from 1 to 2.
4. The magneto-resistance effect element according to claim 1, further comprising an anti-ferromagnetic layer formed on an opposite side of the first ferromagnetic layer from the tunnel barrier layer.
5. The magneto-resistance effect element according to

claim 1, wherein at least one ferromagnetic layer of the first to third ferromagnetic layers is a stacked film where a ferromagnetic film and a non-magnetic film are stacked alternatively.

6. The magneto-resistance effect element according to claim 1, wherein the intermediate layer is a single-layered ferromagnetic film or a stacked film where a ferromagnetic film and a non-magnetic film are stacked alternatively, and anti-ferromagnetic exchange coupling or ferromagnetic exchange coupling exists, via the non-magnetic film, between the adjacent ferromagnetic films of the stacked film.

7. The magneto-resistance effect element according to claim 1, wherein the second ferromagnetic layer and the intermediate layer have the same film face shape, and the third ferromagnetic layer magnetically contact with the intermediate layer.

8. A magneto-resistance effect element comprising:  
a first ferromagnetic layer serving as a magnetization fixed layer;  
a magnetization free layer which is provided on one side of the first ferromagnetic layer, the magnetization free layer having a T-shape in a section perpendicular to a film face thereof taken along a magnetization easy axis of the magnetization free layer; and  
a tunnel barrier layer provided between the first ferromagnetic layer and the magnetization free layer.

9. The magneto-resistance effect element according to claim 8, wherein the magnetization free layer comprises a second ferromagnetic layer, a third ferromagnetic layer which is formed on an opposite side of the second ferromagnetic layer from the tunnel barrier layer and

has a film face having an area larger than that of the second ferromagnetic layer and whose magnetization direction is changeable by an external magnetic field, and an intermediate layer which is provided between the second ferromagnetic layer and the third ferromagnetic layer and which transmits a change of magnetization direction of the third ferromagnetic layer to the second ferromagnetic layer.

10. The magneto-resistance effect element according to claim 8, wherein an aspect ratio of a plane shape of the magnetization free layer is within a range from 1 to 2 in any section parallel to the film face thereof.

11. The magneto-resistance effect element according to claim 8, further comprising an anti-ferromagnetic layer formed on an opposite side of the first ferromagnetic layer from the tunnel barrier layer.

12. The magneto-resistance effect element according to claim 8, wherein at least one of the first ferromagnetic layer and the magnetization free layer is a stacked film where a ferromagnetic film and a non-magnetic film are stacked alternatively.

13. The magneto-resistance effect element according to claim 9, wherein the intermediate layer is a single-layered ferromagnetic film or a stacked film where a ferromagnetic film and a non-magnetic film are stacked alternatively, and anti-ferromagnetic exchange coupling or ferromagnetic exchange coupling exists, via the non-magnetic film, between the adjacent ferromagnetic films of the stacked film.

14. The magneto-resistance effect element according to claim 9, wherein the second ferromagnetic layer and the

intermediate layer have the same film face shape, and the third ferromagnetic layer magnetically contact with the intermediate layer.

15. The magneto-resistance effect element according to claim 9, wherein the intermediate layer has the same film face shape as the third ferromagnetic layer and is a non-magnetic metal layer.

16. A magnetic memory comprising a first wiring, a second wiring crossing the first wiring and a magneto-resistance effect element according to claim 1, which is provided in a crossing region of the first and second wirings, wherein the second and third ferromagnetic layers of the magneto-resistance effect element constitute a storage layer whose magnetization direction is changeable according to a magnetic field generated by causing a current to flow in at least one wiring of the first and second wirings, and the third ferromagnetic layer is provided adjacent to the one wiring generating the magnetic field.

17. The magnetic memory according to claim 16, wherein a part of a periphery of the one wiring generating the magnetic field is covered with the third ferromagnetic layer.

18. The magnetic memory according to claim 16, wherein a yoke is provided on an opposite face of the one wiring, to which the third ferromagnetic layer is provided adjacent, from the third ferromagnetic layer.

19. The magnetic memory according to claim 16, further comprising a MOS transistor or a diode for reading storage information in the magneto-resistance effect element.

20. A magnetic memory comprising a first wiring, a second wiring crossing the first wiring and a magneto-resistance effect element according to claim 8, which is provided in a crossing region of the first and second wirings, wherein the magnetization free layer of the magneto-resistance effect element constitutes a storage layer whose magnetization direction is changeable according to a magnetic field generated by causing a current to flow in at least one wiring of the first and second wirings, and the magnetization free layer is provided adjacent to the one wiring generating the magnetic field.

21. The magnetic memory according to claim 20, wherein the magnetization free layer comprises a second ferromagnetic layer, a third ferromagnetic layer which is formed on an opposite side of the second ferromagnetic layer from the tunnel barrier layer and has a film face having an area larger than that of the second ferromagnetic layer and whose magnetization direction is changeable by an external magnetic field, and an intermediate layer which is provided between the second ferromagnetic layer and the third ferromagnetic layer and which transmits a change of magnetization direction of the third ferromagnetic layer to the second ferromagnetic layer,  
and the third ferromagnetic layer is provided adjacent to the one wiring generating the magnetic field.

22. The magnetic memory according to claim 21, wherein a part of a periphery of the one wiring generating the magnetic field is covered with the third ferromagnetic layer.

23. The magnetic memory according to claim 21, wherein a

yoke is provided on an opposite face of the one wiring, to which the third ferromagnetic layer is provided adjacent, from the third ferromagnetic layer.

24. The magnetic memory according to claim 20, further comprising a MOS transistor or a diode for reading storage information in the magneto-resistance effect element.

25. A magnetic head comprising a magneto-resistance effect element according to claim 1 as a magnetic reproducing element.

26. A magnetic head comprising a magneto-resistance effect element according to claim 8 as a magnetic reproducing element.